E 110A

Dry plasma chamber cleaning

Preliminary condition:

- Once a cleaning procedure has been requested and the machine has completed all the etching processes, you can start a dry plasma cleaning procedure.

Tools required:

- Oxygen gas supplied to the O2 gas line of the machine
- Optional : an optical emission spectroscopic system
- Dummy Si wafer

1 Select a plasma cleaning process in the process library

- In the "**System**" screen, click on the "**Edition**" icon.
- Check if a plasma cleaning process is already existing in the process library:
  - If yes, go directly to 4
  - If no, you must create a plasma cleaning process. Go to 2

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❷ Create the cleaning steps

If the plasma cleaning process is not already existing , you must create it.
The cleaning process includes :

- a heating step
- a process step

To create the heating step, proceed as follows:

- Select the "**Process library**" tab in the "**Process Edition**" screen
- Click on the "**New**" button in the step library area
- Enter a name, possibly together with a comment, for the heating step
- Select the "**Chuck temp. control"** option
- Click OK
- In the "**Step edition**" screen, specify the following parameters:
  - wafer temperature = 20 °C
  - duration: unlimited
  - He pressure: 1.0 E1 mbar

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To create the process step, proceed as follows:

- Select the "**Process library**" tab in the "**Process Edition**" screen
- Click on the "**New**" button in the step library area
- Enter a name, possibly together with a comment, for the process step
- Select the "**Process"** option
- Click OK
- In the "**Step edition**" screen, specify the following parameters:
    - O2 mode : ramp
    - O2 flow = 200 sccm
    - A = B = 200
    - C= D = 1
    - Regulation mode: position
    - Pressure = 100%
    - Source = 2000 W
    - Chuck : P option selected
    - Chuck = depending on the machine configuration *
    - He pressure: 1.0 E1 mbar
    - Process duration = this time depends on the degree of deposit to be cleaned. This time is unknown before processing so set this time to 30 min.

* Machine configuration

Chuck RF generator		LF generator	
XMB	ESC	Pulsed	Not pulsed
100 W	50W	50 W	8 W

3 Create the plasma cleaning process

Create the plasma cleaning process:

- Click on the "**New**" button in the process library area
- Enter a name, possibly together with a comment, for your cleaning process
- Add both steps previously created.

4 Place a dummy wafer in the cassette

- Place the dummy wafer in the slot #1 of the cassette

5 Start the plasma cleaning process

- Go back to the "**System**" screen
- In the "**System**" screen, click on the "**Process**" icon.
- In the "**Run process**" screen, select:
  - Multiple process mode
  - in the wafer # 1 line, select the plasma cleaning process previously created
  - click "**GO**"

6 Check the end of the plasma cleaning process

The criteria to end the plasma cleaning process are based on the fact that, during the process, the oxygen will react with the CF containing polymer to produce CO and F species. While the polymers are removed, the pressure decreases until all polymers are removed. Then, the process pressure will reach a minimum value.

One consider that the process chamber is clean when the process pressure has decreased to a value which is kept constant during one minute.

If after 30 minutes, the cleaning criteria has not been completed, repeat the whole cleaning procedure.

Optical emission spectroscopy (optimal)

Select an OES (positioned on 298.8 mm (CO line)) EPD with the cleaning step edition and track the intensity during the cleaning process.
One consider that the process chamber is clean when the CO line intensity has decreased to a value which is kept constant during one minute.